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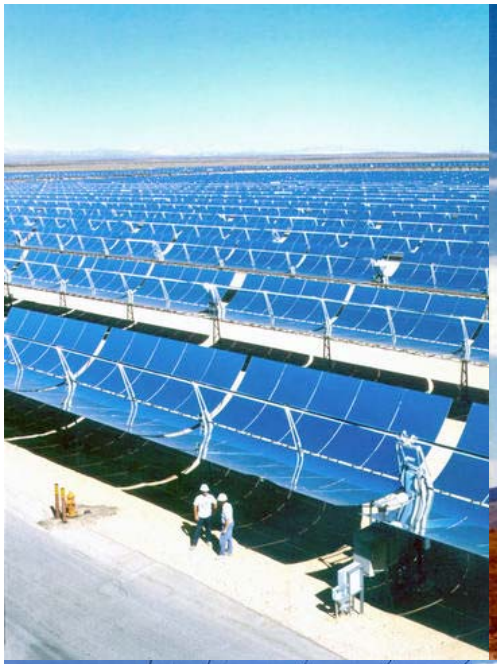

Western Wind and Solar Integration Study Update

Debbie Lew

Technical Review Committee Conference Call

Nov 9, 2007

earch Institute • Battelle

Agenda

- Update on overall progress
- Data Collection Progress
  - Utility
  - Wind and Solar
- Wind and Solar Site Selection Process
- Other Issues

Task Progress

- Kick-off Meeting (5/07) - NREL
  - Stakeholder input to study scope
- Data Collection (6/07-12/07)
  - Load, forecast, generator data for utilities in our footprint. Need TriState and WAPA data - Exeter
  - Generator and transmission data for WECC - Exeter
  - Wind mesoscale modeling underway - 3Tier
  - Solar mesoscale modeling being negotiated - Richard Perez
  - Site Selection - NREL/3Tier
- Preliminary Analysis (1/08-6/08) - GE
  - Extensive statistical analysis with various options for wind/solar sites and transmission
- Scenario Development (6/08) - GE
  - In-state vs out-of-state resources
  - Geographically diverse resources
  - Mega projects
  - Best correlated with load
  - 20% and 30% as individual control areas and single control area
  - High penetration of PV

Tasks

- Stakeholder Meeting (7/08) - NREL
  - Review analysis and provide input to scenarios
- Run Scenarios (7/08-1/09)- GE
  - Run baseline, high renewables scenario and other scenarios, examining operating impacts and costs due to regulation, load following, unit commitment
  - “Dives” to investigate issues such as Hoover
  - Examine mitigation strategies/options
  - Determine contributions to reliability and capacity value
- Interim Technical Results Meeting (12/08) - GE/NREL
  - TRC to review interim results and make course corrections if appropriate
- Draft Report (2/09) - GE
- Stakeholder Meeting (3/09) - NREL
  - Review draft analysis
- Final Report (4/09) - GE
- Final Stakeholder Meeting (4/09)- NREL
  - Present final analysis

Utility Data Collection

- Tri-State - need all data
- WAPA - need all data
- Tucson - need load and forecast data
- Some utilities don’t have load forecasts or only partial load forecast data
- Load data with and without Tri-State if possible
- WECC datasets

Wind Mesoscale Modeling - 3Tier

- Generate mesoscale model data for western US
- Site selection
  - Up to 30,000 sites (2km x 2km) = 900 GW
- Generate wind plant output for these sites
- Simulate wind forecasts for wind sites
- Simulate solar forecasts for solar sites

- Solar meso data for 2004-5 completed, negotiating purchase of 2006

Wind Site Selection Process

- Start with sites that we know are likely to be operational
  - Existing and planned (by end '08) wind plants
  - Input from utilities and developers on likely development (by 11/19)
  - Possibly use CA IAP, NWIAP, and WINDS scenarios which represent 25% wind penetration in WECC
- Criteria to select remaining sites after sensitive areas have been excluded:
  - Capacity factor (air density corrected) - 20,000 sites
  - Load correlation factor (capacity factor during peak months/hours divided by total capacity factor) with minimum capacity factor - 10,000 sites
  - Transmission corridors (defined based on distance from potential paths) with minimum capacity factor - 10,000 sites
- Final check to ensure we have sites to address various scenarios:
  - In-state sites to meet RPS++
  - Geographically diverse sites
  - Mega-project sites

Solar Site Selection Process

- Start with sites that we know are likely to be operational
  - Existing and planned (by end '08) solar plants
  - Input from utilities and developers on likely development
  - Possibly use CA IAP scenario, input from AZ RE task force
- Criteria to select remaining sites after sensitive areas have been excluded:
  - Capacity factor
  - Transmission corridors with minimum capacity factor
- Final check to ensure we have sites to address various scenarios:
  - In-state sites to meet RPS++
  - Geographically diverse sites
  - Mega-project sites
  - High penetration PV

Other Issues

- Need 1 minute (or 4 second) utility load data within a month of event selection - process NDAs as appropriate now